VIA EFS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re:	Patent Application of Takuya Matsumoto, *et al.*	Group Art Unit: 1713
Conf. No.:	9416	
Appln. No.	10/672,946	Examiner: Michael Bernshteyn
Filed:	September 26, 2003	
For:	(meth)acrylic COMPOUND HAVING AN OXETANYL GROUP AND LIQUID CRYSTAL FILM PRODUCED BY USING SAME	Attorney Docket No.: 8305-233US (61-0002-1)

REQUEST FOR RECONSIDERATION

This is in response to the Office Action dated September 22, 2006 (Paper No. 20060913), in the above-referenced application. This Request for Reconsideration is being timely filed before December 22, 2006.

REMARKS

Claims 1-12 are currently pending in the application.

Prior Art Rejection

In the Office Action, the Examiner has rejected claims 1-12 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,136,225 of Meyer, *et al.* ("Meyer") in view of JP 08-020641 and JP 06-308462 of Kawakami, *et al.* (collectively "Kawakami"). The Examiner continues to argue that Meyer discloses a polymerizable liquid crystalline compound having terminal reactive groups via which polymerization can be effected, wherein the terminal reactive groups, Z^1 and Z^2, may be selected from various disclosed polymerizable groups which include (meth)acrylic moieties and epoxy groups.

Meyer allegedly teaches that by polymerizing the novel compounds or liquid-crystal compositions it is possible to fix the liquid-crystalline ordered state, and that the polymerization may be effected thermally or photochemically. The Examiner acknowledges that Meyer does not teach the specific use of an oxetane group. However, Kawakami allegedly teaches that for high molecular weight liquid crystals with a main chain consisting of polyoxetane (which the Examiner contends is an analog to present claim 2), the number average molecular weight is preferably 1,000 to 1,000,000 and the area ratio of A (a monodisperse ratio) to B (a non-monodisperse ratio) is 10:0 to 9:1. The Examiner concludes that based on Kawakami, it would have been obvious to one skilled in the art to incorporate oxetanyl functional groups as one of the Z groups in formula 1 of Meyer in order to obtain a high molecular weight liquid crystal with a main chain consisting of polyoxetane, having specific recurring units and exhibiting high response rate to electric field change, even at elevated temperatures, and excellent display characteristics for wide screens or curved screens.

The Examiner also acknowledges that Meyer does not disclose the use of photo cationic initiator for the process of polymerization, as recited in claim 7. However, Kawakami allegedly teaches that the obtained monomer has cationic polymerization nature and can be made using a cationic polymerization catalyst. Therefore, the Examiner concludes that it would have been obvious to incorporate the cationic inhibitor of Kawakami in the polymerization process of Meyer for the polymerization of polymeric liquid-crystalline compositions because the above mentioned monomer with oxetanyl functional group has cationic nature.

Regarding claims 8-12, the Examiner argues that Meyer describes the remarkable optical properties of liquid crystal materials based on their anisotropic ordered state, and that liquid crystal compositions are outstandingly suitable for coating surfaces. Meyer allegedly also teaches a process for the production of such coatings having a liquid-crystalline ordered state which involves diluting the liquid-crystal compositions, which may comprise further polymerizable compounds and chiral compounds, with a diluent to reduce the viscosity, applying the mixture to a substrate, effective a liquid-crystalline alignment and then polymerizing the compounds applied to the substrate. The liquid-crystalline alignment is formed either

spontaneously during application or is achieved by known physical methods, such as by rubbing or applying an electric magnetic field.

In the absence of a showing of criticality, the Examiner concludes that it would have been obvious to one skilled in the art to use the orientation (anisotropic) state of a liquid crystal material which contains different groups (phases) of orientation, followed by fixing the orientation by light irradiation and/or heat treatment for producing liquid crystal optical film from Meyer and Kawakami's polymerizable liquid-crystalline compounds in order to obtain the desired remarkable optical properties based on their anisotropic ordered state. Applicants respectfully traverse this rejection as follows.

The object of the presently claimed invention is to provide a novel compound which may be easily synthesized, has excellent orientability and capability of fixing its orientation structure, and which is suitable as the starting material of a side chain liquid crystalline polymeric substance. Such novel compounds were developed in order to solve the problems with prior art compounds described in the background of the present application, such as obtaining sufficiently high T_g, heat resistance, and reactivity of reactive groups after orientation. More specifically, the presently claimed invention recited in claims 1-6 is directed to a compound containing a mesogen group having a polymerizable group (a (meth)acryloyl group and an oxetanyl group) at each end. These polymerizable groups, which each exhibit different reactivities, are bonded to the mesogen group via spacers. The presently claimed invention is also directed to a side chain liquid crystalline polymeric substance derived from this compound.

Meyer teaches a compound containing a mesogen groups having reactive groups which exhibit polymerizability at both ends. Specific examples of such groups are disclosed at col. 2, lines 31-52. However, Meyer does not teach or suggest that groups with <u>different reactivities</u> are bonded to the mesogen group, that is, combining groups which are different in reactivity from each other. Therefore, when the reactive groups of Meyer are reacted, they are consumed or exhausted by the reaction. Furthermore, since they are at least difunctional, the

reaction product will be cross-linked, resulting in difficulties in post modification and processing of the product. Accordingly, the problems described in the present application are not solved with the compound of Meyer.

Kawakami discloses polyoxetane compounds with mesogen groups. Like Meyer, Kawakami does not teach or suggest two <u>different</u> reactive groups bonding to a mesogen group. Kawakami also does not teach an oxetane group, but rather a polyoxetane. As previously explained on the record, epoxide groups () and oxetane groups () are both structurally and reactively different from one another. The strains placed on the bonds between the carbons and the oxygen in a three-membered cyclic ether (*i.e.*, epoxide) are entirely different than the strains on the bonds in a four-membered oxetane group. Accordingly, as clearly evidenced in the previously submitted Declaration of Hitoshi Mazaki, the reactivity of the two structures is vastly different and one of ordinary skill in the art would not expect the two moieties to be substitutable for one another. That is, reactions which may be conducted with a three-membered epoxide group may not necessarily be carried out with a four-membered oxetane group, and *vice versa*. Accordingly, it can clearly be seen that epoxide compounds and oxetane compounds do not react similarly and it cannot reasonably be said that one of ordinary skill in the art would be motivated to use an oxetane group in light of a disclosure which only specifically references an epoxide.

Further, even if one skilled in the art would have been motivated to substitute an oxetane group for the epoxide group of Meyer, such a compound would still not contain a liquid crystalline compound having different polymerizable groups which can be easily formed into a side chain liquid crystalline polymer and still have reactive groups (polymerizable groups) even after being polymerized, as in the presently claimed invention. Accordingly, even the presently claimed invention would not have been obvious based on the proposed combination of Meyer and Kawakami.

Claims 7-12 are related to a liquid crystal film, a method of production thereof, and an optical film using the liquid crystal material and depend directly or indirectly from claim 1. Accordingly, regardless of any teaching by Meyer of optical properties of liquid crystal materials or the use of such materials for forming coatings or films, the proposed combination of

Meyer and Kawakami would still not teach or suggest all of the claimed elements, such as a liquid crystalline compound having different polymerizable groups which can be easily formed into a side chain liquid crystalline polymer and still have reactive groups after being polymerized. Accordingly, even the proposed combination of Meyer and Kawakami would not teach or suggest all of the elements of claims 7-12.

For all of these reasons, reconsideration and withdrawal of the § 103(a) rejection based on Meyer in view of Kawakami are respectfully requested.

Double Patenting Rejection

The Examiner has provisionally rejected claims 1-12 on the ground of obviousness-type double patenting as being unpatentable over claims 1-10 of co-pending application No. 10/825,557. The Examiner argues that present claim 1 and prior claim 1 recite the same compound of formula (1) with the same substituents, and that present claim 3 recites the same polymerizable compound of formula (8) and the same substituents as prior claim 2. The Examiner further argues that present claims 2 and 4-12 contain analogous limitations to prior claims 3-10. Applicants note that the '557 application issued on October 24, 2006 as U.S. Patent No. 7,125,590. While not necessarily agreeing with the Examiner's conclusions, Applicants submit herewith a Terminal Disclaimer and Statement of Common Ownership with respect to the '590 patent. Accordingly, reconsideration and withdrawal of the double patenting rejection are respectfully requested.

In view of the preceding Remarks and enclosed Terminal Disclaimer, Applicants submit that all pending claims patentably distinguish over the prior art of record and known to Applicants. Reconsideration, withdrawal of the rejections and a Notice of Allowance are respectfully requested.

Respectfully submitted,

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December 19, 2006 By: Sandra M. Katz
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